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PHYSIOLOGICAL REACTIONS OF A PASSENGER TO  
TRANSPORTATION CONDITIONS

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and V. P. Novoselov

Translation of "O fiziologicheskikh reaktsiyakh  
organizma passazhira na usloviya perevozki,"  
Gigiyena i Sanitariya, No. 9 (Sep), 1979, pp. 84-85

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16. Abstract In this work, the effect of transportation conditions on the performance capacity of a passenger were studied, in order to establish the time for his most rapid inclusion in production activity after the trip.  Based on the conducted studies one can draw the conclusion, that the transportation conditions impair the functional condition of the passenger's organism.  The restoration of the functional state to the initial level occurs mainly in the space of one day. It is also necessary to take into consideration the adaptation of the organism during transfer to another climate zone.			
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PHYSIOLOGICAL REACTIONS OF A PASSENGER TO  
TRANSPORTATION CONDITIONS

By Candidates of Medical Sciences A. M. Lakshin and V. P. Novoselov\*

In this work we studied the effect of transportation conditions on the performance capacity of a passenger in order to establish the time for his most rapid possible inclusion in production activity after the trip. This is especially important for such a category of passengers as participants of the student construction teams that travel to work immediately after intensive intellectual activity linked to the preparation of examinations and their passing.

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Eighteen practically healthy students in age from 18 to 25 were selected as the subjects; they had departed in the student construction team for work after the examination session. The studies were made in July 1977 before the trip, during the trip in an open type car along the route Moscow-Astrakhan' that lasted 32 h, and after arrival. The microclimate parameters in the car were the following: air temperature from 25 to 27°C in the first 12 h of the trip and from 28 to 33.4°C on the second day, relative air humidity 84 and 44% respectively, velocity of movement of the air in the zone of the sleeping

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bunks 0.04-0.18 m/s, in the passage up to 0.37 m/s.

The conditions of the passengers was judged from the degree of change of certain functional indices in the trip dynamics. For this purpose an analysis was made in the subjects of the time for simple visual-motor reaction with the help of a chronoreflexometer in the system of experimental production of the F. F. Erisman Moscow Scientific Research Institute; the rate of processing information by visual analyzer with the use of the correction test--Landolt's ring (to calculate the rate of processing information a formula was used that was suggested by A. A. Genkin et al.), physical performance capacity with the help of the physiological test PWC-170; strength of the flexor muscles in the right wrist with the help of Abolakov's dynamometer; pulse rate was taken by palpation. Before determination of the time for simple visual-motor reaction and the rate of processing information by visual analyzer a stable dynamic stereotype was preliminarily worked out for the subjects. The stereotype was considered developed if several of the last measurements differed little. The statistical processing of the data was conducted according to Student-Fisher. /85

The studies demonstrated, that in the first 12 h of the trip, when the air temperature in the car was in the limits of 25-27°C with relative air humidity 84-65%, the rate of processing information by the visual analyzer was reduced in the passengers ( $P<0.01$ ), while the pulse rate in this period did not significantly change. On the second day of the trip, with air temperature in the car 28-33.4°C, and relative humidity 65-44% a decrease was observed in the physical performance capacity according to test data (PWC-170; ( $P<0.05$ ) and increase in the dynamics of the pulse rate ( $P<0.02$ ), the rate of processing information of the visual analyzer was somewhat increased, but remained lower

than the initial ( $P < 0.02$ ). Upon arrival at the site an increase was found in the time for simple visual-motor reaction ( $P < 0.01$ ) and the greatest increase in pulse rate ( $P < 0.01$ ). The rate of processing information and PWC-170 test at this time were not determined. In the morning of the next day, the time for the simple visual-motor reaction in the subjects was in the limits of the initial amounts, the rate of processing information by visual analyzer remained reduced ( $P < 0.01$ ), and the physical performance capacity (PWC-170) approached that recorded in the beginning of the trip ( $P < 0.01$ ); the pulse rate was somewhat diminished, but still had not reached the initial level ( $P < 0.01$ ). Within 1 day after arrival the functional indices, with the exception of pulse rate, practically had reached the initial level. The pulse rate remained four beats higher than the original, apparently, due to the influence of the climate zone, the higher air temperature in Astrakhan' as compared to Moscow. No significant changes were noted in the strength of the flexor muscles of the hand in the subjects during the entire period of observations. The revealed shifts in strength were statistically unreliable ( $P < 0.1$ ).

Thus, the trip conditions had the earliest effect on the functional condition of the central nervous system. Here changes in its activity were revealed in the beginning of the trip with microclimate parameters in the car close to the hygienic standards, when there were still no significant shifts on the part of other studied functions. Such a nature of functional changes can be explained by the reaction of the organism to the unusual situation as compared to daily life. This viewpoint is confirmed also by the fact that on the second day of the trip with considerably worse microclimate parameters in the car the rate of processing information on the visual analyzer rose as compared to that established in the previous study. Changes in the physical performance capacity

according to the data of the PWC-170 test, and pulse rate were primarily due to the microclimate parameters in the car.

Based on the conducted studies one can draw the conclusion, that the transportation conditions impair the functional condition of the passenger's organism. Here the situation and the microclimate parameters in the car have an influence. The restoration of the functional state to the initial level occurs mainly in the space of one day. It is also necessary to take into consideration the adaptation of the organism during transfer to another climate zone.

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